

Basis for Amendments to the Claims

Applicants have amended Claims 16 and 35 such that the TEA⁺/SiO₂ ratio of the gel is required to be between 0.10 and 0.18. Basis for this amendment can be found on page 6, lines 21-26 of the Application.

Applicants have also amended Claim 58 to clarify the preamble of the claim to overcome a rejection under 35 U.S.C. Section 112.

No new subject matter is introduced by these amendments to the claims.

Discussion

Disclosed within the Application is a process for the production of a zeolite of the ZSM-12 type, the zeolite itself, and a catalyst which is suitable for various processes, such as the hydroisomerization of higher paraffins, using this zeolite. Applicants have surprisingly discovered that a particularly useful zeolite of the ZSM-12 type can be prepared from an aluminum source, a silicon source, a TEA⁺ source as a template, and an alkali metal or alkaline earth metal ion source M having a valence of "n", wherein the H₂O:SiO₂ ratio of the gel is from 5 to 15, and wherein the molar TEA⁺/SiO₂ ratio is between 0.10 and 0.18. Surprisingly useful ZSM-12 zeolites are produced by this process.

The USPTO rejected Claim 58 under 35 U.S.C. Section 112 as being indefinite. Applicants have amended the preamble of Claim 58 and request withdrawal of this rejection.

The primary basis for the rejection of the claims of the Application is Katovic, et al., in view of Rosinski, et al. (U.S. Patent No. 3,832,449), Kuhl (U.S. Patent No. 4,552,739) and Kresge, et al. (U.S. Patent No. 4,599,475). In rejecting various dependent claims, the USPTO also cited Sumitani, et al. (U.S. Patent No. 4,557,919) and Monque, et al. (U.S. Patent No. 5,576,256). Applicants respectfully traverse each rejection of the claims of the Application and assert that the claims, as amended, are patentable over the references cited.

The primary reference cited by the USPTO is Katovic, et al. which disclose a process of synthesizing ZSM-12 zeolites. The primary focus of Katovic, et al. is the disclosure of which process steps encourage the formation of ZSM-12 zeolites and which process steps encourage the formation of other materials, particularly ZSM-5. "Since ZSM-5 crystallizes together with ZSM-12, the aim of this work is to investigate the crystallization range where ZSM-12 zeolite is the only crystalline phase." Katovic, et al., page 969, first paragraph.

To further distinguish the process of the Applicants from that disclosed by Katovic, et al., Applicants have amended the claims to require a $\text{TEA}^+/\text{SiO}_2$ ratio of from 0.10 to 0.18. Katovic, et al. disclose that the use of a $\text{TEA}^+/\text{SiO}_2$ ratio of 0.7 in the process as shown in samples 1 and 2 of Table 1, fails to produce ZSM-12, but rather produces primarily ZSM-5. In contrast, when the $\text{TEA}^+/\text{SiO}_2$ ratio is 0.2 (10/50) as shown solely in Sample 4, ZSM-12 is produced in significant quantities. (Note also that the only ratios of $\text{TEA}^+/\text{SiO}_2$ that are disclosed by Katovic, et al. are 0.07 (Samples 1 and 2) and 0.2 (Samples 3-8)). As stated on page 971 of Katovic, et al.

In order to clarify the role played by the TEA^+ ions, series of hydrogels with different organic contents were investigated, and the results are shown in Figure 1. The nature and crystallinity of the products are significantly influenced by the amount of organic molecules in the initial reaction mixture. From these systems, ZSM-12 zeolite crystallizes in a very restricted range of TEABr content. In the presence of lowered TEABr amount, ZSM-5 is

the only zeolitic phase detected, while increasing the amount of TEA⁺ ions in the reaction system the crystalinity decreases.

When reviewing the disclosure of the examples of Table 1, a person skilled in the art would immediately recognize that ZSM-5 is the primary material produced when the TEA⁺/SiO₂ ratio is 0.07 (3.5/50). In contrast, a fair reading of Katovic, et al. teaches that when the ratio is increased to 0.2 (10/50), optimum quantities of ZSM-12 are produced. (See Sample 4). Thus, a person skilled in the art would have been taught to use a ratio for TEA⁺/SiO₂ of at least 0.2. A fair reading of Katovic, et al. is that the use of lesser quantities of TEA⁺/SiO₂, such as is claimed by Applicants, would not be successful at producing useful quantities of ZSM-12.

In contrast, Applicants have surprisingly discovered that significant quantities of ZSM-12 are produced when the ratio of the TEA⁺/SiO₂ is between 0.10 and 0.18, as shown in the Examples of the Application. (Note in Example 1 the use of a ratio of 0.15 and in Example 9, the use of a ratio of 0.1377.) In contrast, from the disclosure of Katovic, et al., a person skilled in the art would believe that a limited quantity of ZSM-12 zeolite would be produced when the claimed ratio of TEA⁺/SiO₂ was used. Accordingly, this discovery is surprising, especially as Katovic, et al. do not teach the production of ZSM-12 in amounts other than trace amounts when ratios lower than 0.2 are used.

To overcome deficiencies in the disclosure of Katovic, et al. the USPTO cited Rosinski, et al. which disclosed a method for producing ZSM-12 zeolites. However, Rosinski, et al. fail to disclose the required $\text{TEA}^+/\text{SiO}_2$ ratio. In addition, as previously advised, the process of Rosinski, et al. is entirely different from the Applicants' process and also different from the process of Katovic, et al. Rosinski, et al. teach that only colloidal silica can be used as the source of silica as it is disclosed in all examples. The USPTO has previously rejected this argument and asserted that while Rosinski, et al. do not disclose the use of precipitated silicas, Katovic, et al. does make this disclosure.

However, the distinction between the use of colloidal silica and precipitated silica to produce the claimed zeolite was quite important to Applicants. The particular type of silica chosen, when using Applicants' process, produces distinctly different zeolite products. In the Application, Inventive Examples 1 and 9 use "precipitate silica" while "Comparative Example 5" used "colloidal silica". The zeolite product produced in Comparative Example 5 using colloidal instead of precipitated silica contained a significant quantity of ZSM-5. While Applicants acknowledge that some ZSM-12 was also produced, no person skilled in the art would use this process when a better process was available to produce higher quantities of ZSM-12, as disclosed in Examples 1 and 9.

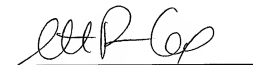
Applicants further rely on the additional arguments made in their Amendment which was filed on July 16, 2010 and incorporate those arguments into this Amendment.

It is not necessary to discuss the remaining references cited in the Office Action as they all depend on the disclosure of Katovic, et al., which has been distinguished.

CONCLUSION

For the reasons stated above, including the amendments to the claims, Applicants assert that all claims are now in condition for allowance and request the issuance of a Notice of Allowability. If there are any questions, please contact Applicants' counsel.

Respectfully Submitted,



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CERTIFICATE OF EFS SUBMISSION (37 C.F.R. § 1.8(a)(1)(C))

I hereby certify that, on the date shown below, this correspondence is being submitted to the Patent and Trademark Office via the Office Electronic Filing System in accordance with § 1.6(a)(4).

Date: May 17, 2011

Holly Hart
Signature